

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2024
(Regular/Improvement/Supplementary)

PHYSICS

GPHY2B02T: MECHANICS II

Time: 2 Hours

Maximum Marks: 60

SECTION A: Answer the following questions. Each carries *two* marks.

(Ceiling 20 Marks)

1. What are non-inertial frames? Give an example.
2. Define the term resonance in a driven harmonic oscillator.
3. A satellite is in elliptic orbit about the earth. At perigee it has an altitude of 1,100 km and at apogee its altitude is 4,100 km. Find the major axis of the elliptic orbit. (Radius of earth is 6400 km)
4. State the Kepler's law of periods.
5. What is time average value of a function.
6. Differentiate between group velocity and phase velocity.
7. State Fourier Theorem.
8. Give the equation for plane progressive wave motion and explain the terms.
9. Distinguish between Newton's and Laplace's models for determining the velocity of sound.
10. What is meant by the term "decibel."
11. Provide the equation representing the apparent force in a rotating frame and elucidate its constituent terms.
12. What is meant by modes of vibrations?

SECTION B: Answer the following questions. Each carries *five* marks.

(Ceiling 30 Marks)

13. What are Galilean transformations? Derive Galilean transformation equations.
14. State and explain the principle of equivalence.
15. Air flow on the earth is strongly influenced by Coriolis force. Describe.
16. Reduce a two-body central force motion to a one body problem.
17. Write down the equation for effective potential energy of gravitational force and hence discuss the different types of planetary motions using energy diagram.
18. Calculate quality factor Q when a paper weight suspended from a rubber band had a period of 1.2 seconds and its amplitude of oscillation decreased by a factor of 2 after three periods.
19. Obtain the expression for energy density of a plane progressive wave.

SECTION C: Answer any *one* question. Each carries *ten* marks.

20. Formulate the differential equation of a damped harmonic oscillator and write down the general solution. Analyze different damping scenarios and illustrate them graphically.
21. Explain the features of motion governed by central forces.

(1 x 10 = 10 Marks)